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Williams, William Henry

Economical operation of
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[Washington, D.C.]

[1923]

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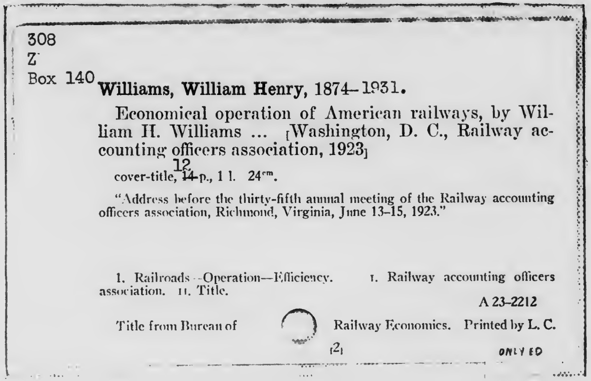

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ECONOMICAL OPERATION OF AMERICAN RAILWAYS

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By

WILLIAM H. WILLIAMS

Chairman of the Board

Wabash Railway Company

ADDRESS

Before the Thirty-fifth Annual Meeting
of the Railway Accounting Officers
Association, Richmond, Virginia,
June 13-15, 1923

Published by
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ECONOMICAL OPERATION OF AMERICAN RAILWAYS

William H. Williams

Chairman of the Board

Wabash Railway Company

President L. G. Scott: As stated yesterday, it is the policy of our Association to invite men of national reputation, men of ideas and broad vision to deliver addresses at our annual meetings because we welcome ideas and suggestions from authoritative sources.

Every member of this Association is proud, I am sure, of the record that has been made by our fellow member and next speaker, a man who has climbed from the very bottom of railroad service through several departments to the very top, as he is now Chairman of the Executive Committees of two important railroad systems, also Chairman of the Board of Directors of one of these systems. Not being content with mastering the important and difficult railroad problems of all kinds and character, he has also mastered the intricate problems of the anthracite coal mining industry, as he is at the present time actively directing and handling the affairs of one of the largest of such mining companies.

It is a very great personal privilege and pleasure to present to you at this time Mr. William H. Williams.

Mr. Williams: Mr. President and Fellow Members of the Railway Accounting Officers Association,

I read the report in the morning paper, of your proceedings of yesterday, and it contains one or two paragraphs of Mr. Cunningham's remarks. I am quite in sympathy with what he said in regard to reports to the Interstate Commerce Commission, that is, to the extent that some of the information is also essential in the operation of the roads it is no hardship to furnish it to the Commission. Possibly, as to some of the information relative to condition of locomotives, details of accidents and work of that kind, we might reasonably ask some concessions.

I do not know how far I can interest you today in what I have to say, but I hope that some of the thoughts presented will be of use in your day to day work. I cannot deal exhaustively with the problems of which I shall speak, but I shall endeavor to speak suggestively.

The relations between the various departments of a railroad today are, in some measure, like the situation which exists in Europe where each country has a language of its own and each fails to understand the other. I am going to try to bring before you today the problems of the other departments.

We have in railroading, as in every other industry, two classes of statistics. There are financial statistics—which may be said to be the language of the accounting and treasury departments and largely of the executive department, and we have physical statistics—which may be said to be the language of the transportation and maintenance departments. The financial results no more than measure the amount of profit of the institutions; they do not measure the efficiency of the men in the various departments. The financial results, when compared with those of like undertakings measure the relative value of the securities as investments; they afford some test of the wisdom of those who conceived the enterprise, whether they made a wise location for their railroads, had the capacity to select and develop men and whether they exercised sound judgment in making capital expenditures. All those things enter into the cost of securing money, that is, the amount that the corporation has to pay for it. But the responsibility for the location of that railroad rests with men who are now dead and gone. And so, as I said before, financial statistics do not today measure the capacity of the present management nor of the present operating staff.

Oct 4, 1927
AE

The chief duty of any department is to select the employees for responsible positions and to develop them. The railroad business is not essentially different from any other industry. Your President has made some remarks with reference to the mining industry. The mining industry and the railroads have one thing, at least, in common; in fact, I think many things in common—the necessity of selecting their men, the necessity of instructing them, the relations of financial and physical statistics and then, back of all, the fundamental principle that there are variable factors in all lines of business. If you ascertain the variable factors, the causes of fluctuation and the extent to which you can go economically, you have solved the problem in any undertaking.

In our physical statistics we deal with two elements—human effort and materials; and we may for a moment take up human effort from the individual standpoint. The production engineers of former years divided human effort into three branches—brain work, arm work and leg work—and rated them in the order in which I have stated them; and, as you substitute the higher order for the lower, you benefit civilization.

In order to make the most of individual effort, it is necessary that you analyze the performance of the men doing the best work and the performance of the man doing the poorer work. What are the differences in the method of attack? As an illustration of that thought, you may have two men posting—one sitting sideways at the desk, the other facing the desk—and the man facing the desk will post twice as much as the man sitting sideways. The same situation exists in the freight office with waybill clerks; one man will handle one hundred and fifty to one hundred and seventy-five billing tickets per day, another will handle up to three hundred. Ask the reason and the response is that one man is a better man than the other. But, as you watch the two men, you will find a very material difference in the way they approach their work, and if you change the poorer man around so that he will handle his work in the same general way as the other man, there will be a very material increase in the quantity of work that he will perform and without any increased effort on his part.

Now the clerical work on each desk ought to be analyzed in the same way; and when you go out of the office you have the same problem confronting you. Take the question of tamping ties, for instance. If you watch the men on the track tamping ties to ascertain the number of times that the tamping bar is used, you will find that one man handles it 50 per cent more than another to do the same amount of work in a day, due to the different ways in which they attack the problem. When you go into the shops you will find a difference in the work there on the different machines, and when you make an analysis there you will find again the question of the way in which the men attack their work. When you go into the mines, you find the same problems. It seems a relatively simple thing to mine coal. You drill a hole, charge it with some explosive, set it off and then the coal is apparently ready to be loaded into the cars. That is about as far as the literature in this country and the literature in Europe would indicate that the men in the mining business have gone.

In the anthracite industry they have what they call a "chamber," with one miner to a chamber. The chamber is driven twenty-two to twenty-four feet in width and about two hundred feet in length. Then they leave what is known as a pillar, forty to sixty feet in width, depending on the conditions of the roof and the amount of the overburden, and drive another chamber. In driving these chambers they are careful to put all the rock on one side, say, on the left side in each chamber, so that when they come back to recover the coal that has been left in the pillars, they will not have to remove that rock, because they attack the pillar then from the right side.

Realize the situation where in one company there are five thousand miners employed—each man working in a chamber by himself—and consider the problem of supervision. Also bear in mind that there are about thirty-two to thirty-four different dialects spoken among those men, and then think of the relatively small amount of literature and the lack of understanding of the job there has been. That will give some idea of what can be accomplished by efficient instruction and proper supervision. There is a difference between anthracite and bituminous mining, in that in the anthracite mine the coal does not come in solid beds; you may have one bench of rock or you may have two or three benches of rock separating the coal in the one bed. If there is one bench, we refer to it as the top or bottom bench of coal; if there are two, we refer to them as the top and bottom benches, and if a third we refer to it as the middle bench.

In mining the chamber, the first thing to consider is the placement of the hole with reference to the rib—and the distance between holes. The next consideration is the angle on the horizontal at which the hole is driven and then the vertical angle, the depth of the hole, the size of the hole, the character of explosive, the quantity of explosive, the manner of packing, also whether coal should be left in chamber as a cushion for the coal to be blown out. I am only giving these as illustrative of the variable factors with which we have to contend in the mining industry and as indicating that the problems of all business are similar.

As another example, let us take the iron ore mines. In the east, with the very "thin" ore, as we call it, it is necessary to separate the ore so as to make it richer for the furnace. Ore going into the furnace requires 60 to 65 per cent of metallic iron, whereas much of the ore in place has only 30 to 33 per cent of metallic iron. It is necessary to crush it and run it through a separator.

We will assume that, relatively speaking, the problems in mining the ore are the same as in any other mining. We take the ore as it comes out of the mine. The first thing necessary is to break it down, so the first question is, how small we shall break it. The next thing necessary is to dry it, and the next problem is the degree of dryness. Then it is brought into the separator, and you have to regulate your feed; and the question is, how thick you will feed that on the separator belt. You have two belts, the degree of attraction back of the upper belt, and the speed with which the ore should move.

The aim is to so regulate your operation that in the first separation the degree of magnetism will be so adjusted as to attract to the upper belt any ore carrying not less than 60 per cent of metallic iron; after which the refuse is passed through another set of separators where the degree of attraction is intensified and where there will be lifted up any ore with as low as 30 per cent of metallic iron. These so-called "middlings" are passed through a crusher, after which they again pass through the separator.

So, you see, that again the problem is generally similar to those in railroading; to realize that there are variable factors, to ascertain what they are and to adjust the business and the method accordingly.

I know of very few, if any, industries, where such analyses of the individual effort are conscientiously undertaken—where the supervising officers fully appreciate this obligation. The greatest obligation of any man who is occupying a supervisory position is to develop the men under him. He cannot possibly do that without making his department a success. Generally speaking, a man is told that he must do better or give way to some one who can do better. I have usually adopted the practice, when it is recommended to me that a change be made in an important position, of asking the officer in charge of that department, "What is the man doing that you have told him not to do, and what is he failing to do that you have told him to do?" Almost without exception the answer is negative or indefinite.

Now, if you ask yourselves those questions with similar results with reference to any men in your departments who are not giving you 100 per cent efficiency, you will place the responsibility where it belongs, viz., on the head of the department. The failure is his in that he has not properly instructed the men under him, and he cannot do it until he ascertains the cause of some men making better performance than others and gives to the poorer the benefit of that study.

I feel that is a sufficient discussion of the question of individual effort. Now we will look at railroading from the standpoint of group operation. I am going to take it up in the order that a railroad starts operating, that is, you build your track, get the equipment, start to move your trains and then get your traffic.

When you come to track, there are four important elements—possibly five—but rail, ties, ballast and drainage are the four important factors in maintaining your track. The financial statistics do not indicate whether or not the track has been maintained. They indicate the expenditures, but they do not indicate what has happened to the property. If you look at the physical statistics you can get some intelligent view of the situation.

What is the number of miles of main track on each division that are maintained with new rail, and what is the weight of the rail? What is the number of miles of track laid with new rail each year for fifteen years, and the weight of the rail laid? What is the density of traffic each year? Similiar information ought to be secured for the tracks on each division. I make that suggestion because you may be buying sufficient rail to properly maintain the track in its entirety, and yet, through failure properly to apply it, you may be improving the situation on one section of line and letting another division deteriorate, a result that sooner or later adversely affects your traffic. Similar information ought to be secured for each class of track on each division where relayer rail is used.

When you come to the study of ties, there is the question of the number in main tracks, the number in passing tracks, and the number in sidings on each division; the number of each kind of tie, whether hard wood, soft wood treated, soft wood untreated, etc., and the number of soft wood ties with and without tie-plates. The information should show the number that have been laid each year for fifteen years. The study of that, together with the prices, will give you some indication of which is the most economical, and whether the present practice is the proper practice.

Of course, a comparison of the number laid with the total mileage of track ought to be considered. You can make similar analyses as to interlockers, on the basis of the number of levers to be maintained, and you can likewise take up other matters which come under the roadway and structures department. But that analysis, particularly with reference to ties, ought to be made for each operating division, for each supervisor's subdivision and for each track foreman's section.

Where the data are not collected in that way, the man who makes the most noise usually gets the most material and is the most wasteful.

When we go into the shop department, we take up, first, say, the locomotives. You have three general classes of locomotives—passenger, freight and switching, and you have different types and sizes of locomotives. You can today buy locomotives on the basis of weight.

In analyzing shop performance on locomotives, the first step is to ascertain the number of engines of each kind receiving each class of repairs by months, namely, class 1, 2, 3, 4 and 5 repairs, for the past five years, making due allowance for the engines that are scrapped, sold, or withdrawn from service, including in that all engines not making mileage for three months and not actually undergoing repairs during these three months; also making allowance for additions to locomotive stock. Then there should be a statement of engines out of service and not undergoing repairs during the preceding three months, those that are withdrawn and placed in white lead awaiting an increase in traffic and those withdrawn and intended to be scrapped.

For the engines that are repaired, there should be a statement drawn up showing the number, the service to which assigned, the size, the place at which the repairs were made, the class of repairs; also, the shop at which and the date on which the engine previously received class repairs. This statement should also show the average mileage between the former shopping for class 1, 2 or 3 repairs, and the present shopping. The purpose of all this is to measure the efficiency of the repair work as it is being done.

By such analysis one railway found that the locomotives from one of its shops, averaged fifty-six thousand miles between shopping, while the locomotives from its main shop on the system, where they naturally expected the best performance, were averaging only eighteen thousand miles. A study of that situation developed that the round-house people were paying little attention to engines out of the main shop, with the result that when they did get around to making any repairs, these engines had gone so far as to limit the mileage which could be made between shoppings, reducing it from about fifty-six thousand miles to eighteen thousand.

In addition to what I have already suggested, we should ascertain the number of man-hours at each shop on each class of repairs to locomotives, so as to measure the number of man-hours that are being worked on each class of repairs. That will give some idea as to the way in which the men are being handled.

When we take up the question of freight cars, we ought to have an analysis made of the repairs to each class of freight cars, and separated as between all-steel cars, steel under-frame cars and wooden cars.

Were I to criticise the present classification of operating expense accounts, I would direct most attention to repairs to locomotives and repairs to cars.

Repairs to cars are divided into two classes; repairs to freight cars and repairs to passenger cars. Repairs to locomotives are reported merely as "repairs to locomotives." Yet, think of the immense amount of money that is being spent in those three items, and the only information given is the total amount expended for repairs; and think of the very small amount of money that is covered by other accounts that are set up in the Classification of Accounts.

There is no analysis made in the Interstate Commerce Commission's classification of repairs to locomotives or repairs to cars that is useful to the management of any company in the economical operation of the property, and a further study of these accounts ought to be made. For example, in connection with your car repairs, the information should be classified to show for each of the types of cars: (a) the number of end sills supplied, (b) the number of side sills, (c) the number of center sills, (d) the number of sides renewed, (e) the number of ends renewed, (f) the number of roofs renewed, (g) the number of wheels renewed, and similar information covering trucks, draft gear, couplers, air hose, etc. To the extent that we are using specialties we ought to give consideration to the kinds that are renewed, the dates, and the numbers purchased.

A few years ago I was asked to make an analysis of the coupler situation on one road and I was told that a particular coupler was giving great satisfaction, that the number of breakages in relation to the number purchased was almost nil while there was considerable breakage in the case of the Janney couplers. When I asked for a statement of the number of couplers purchased over a given period, I found that no Janney couplers had been purchased in eight years, and that the particular coupler which was reported to be giving such a good performance had been in existence for the previous two years only. Unless you get such elements in their proper relation, you may get very far away from a proper conclusion.

In freight cars, we ought to show the number out of service undergoing repairs, the number out of service awaiting repairs, the number awaiting repairs one month or less and the number awaiting repairs over one month. That ought to be done for locomotives, too.

In the past, mechanical departments have, in a measure, determined the policies of the companies with regard to equipment, before submitting the matter to the executives. They have failed to report certain types or classes of locomotives or cars until they had gotten in a condition requiring so great expenditures of money as to make their withdrawal from service the only economical thing which could be done.

And yet, if you say to the Superintendent of Motive Power, "We will withdraw from service a given type of car at any time that it requires repairs equal to one hundred and fifty dollars per car, but will keep the repairs up and keep the car in service until it requires one hundred and fifty dollars of repairs," you will practically never withdraw those cars from service! It is only through failure to keep up repairs that they allow the equipment to get into such condition as to require six to eight hundred dollars worth of repairs per car, which leaves the management no option except to withdraw the car from service. And yet, generally speaking, I have never seen an accounting department join hands with the management of any company on the situation I have just outlined and get that remedy at any time adopted on any of the roads of the United States.

In connection with your freight car reports, analysis should be made of the M. C. B. repair bills, to ascertain the number of days that your cars are off the home line and on each foreign line, and the amount of the repair bills of each foreign line against your line. Dividing the cars' days into this bill will give you the average cost per day for repairs to your cars on each foreign line. Reverse that operation and ascertain the number of days that cars from each foreign line are on your line, and the amount of repair bills for a year made against each of those foreign lines, and you will ascertain the average daily amount of your repair bill against each of the other lines. This will point out the roads where an investigation of the car repair bills will be worth while. We can make analysis in the same way for passenger cars, but I do not feel that it is necessary to go into details, as a similar practice can be followed.

Coming down to the transportation department, the capacity of the track is measured in trains. Trains must be spaced five to ten minutes apart. As the speed varies the capacity is reduced. It is quite important, therefore, that we handle on each train its full tonnage capacity, because additions to the number of trains necessitate additions to the track capacity, and, of course, beyond that the tonnage that is handled on a train measures the profit that is received.

Your train is made up of locomotives and cars. You can equate the changes in size of locomotives by the thousands of pounds of tractive power. As you go over your cars there is the question of capacity, and the question is presented of the capacity that is utilized in handling a particular class of traffic; and, also, as to each class of traffic, the extent to which the shipper loads that car to its weight or cubic-content carrying capacity.

The importance of that is illustrated in this way: your engine is hauling the dead weight of the car, it is hauling the paying load and, in addition to that, there is the frictional resistance of each car that is handled. On a three-tenths per cent grade, the frictional resistance would be about fifteen tons. So you are handling two constants—the dead weight and the frictional resistance. The paying load is variable. As you increase the paying load up to the capacity of the car, you are very materially increasing the percentage amount of the paying load in the train which one engine can haul.

On one road where an analysis was made recently, the falling off in 1922 as compared with 1920—and I will say that in 1920 we still had the benefit of the cooperation of the shippers which came during the war, when we got the best loading—was such that it required 10 per cent more engines, 10 per cent more cars and 10 per cent more fuel to handle the same tonnage that was handled in 1920. It is just a question of loading the car.

Yet, I should like to ask how many accounting men bring that matter to the attention of the managements of their companies?

Now, in addition to loading, the economical use of cars is dependent on mileage. To some extent loading is controlled by the tariff provisions as to minimum carload weights, and also by the shipper and consignee. An analysis ought to be made to determine which shippers are persistent abusers of the use of cars from a railroad standpoint, ascertaining the number of cars in each class which have been delayed unduly in loading or unloading. Also, each yardmaster should prepare a statement showing separately northbound and southbound cars, the number in yard six hours or less, the number in yard over six and not over twelve hours, the number in yard over twelve hours and not over eighteen, the number in yard over eighteen hours and not over twenty-four, the number in yard over one day. An analysis of that kind will indicate the yards which are having sluggish movements. Furthermore, it is a psychological fact that within six weeks of the time of putting that character of report into effect, the average delay in the yards will be cut in two.

When it comes to locomotives, we have the tractive power, and can equate the difference in sizes of the locomotives, using so many pounds of tractive power as giving the capacity of one. The haul is measured by the tractive power. Then you have the tonnage rating, and you have to make allowance for friction, as I have outlined above, and you have a reduction to make for speed and for temperature, high winds, etc. In the quick dispatch of perishable freight, you usually cut down the tonnage of the locomotive 20 to 40 per cent.

After giving consideration to those factors, the question is how near are you to securing 100 per cent from your locomotives on each division and on each set of runs. In connection with this comes the question of turning at the terminals and the number of man-hours per locomotive turned. Prior to the strike it took about five and one-half hours to turn a locomotive; subsequently, it required about eight hours, which meant a loss on the average, of two and one-half hours on each locomotive every time it reached a terminal. I believe we are getting back to normal, but it is quite important to know the average time it takes to turn a locomotive, because it has a material effect on the mileage.

There has come into vogue recently the practice of running an engine through two or more engine terminals. I was on one road recently where a passenger locomotive hauled the train four hundred and ninety-three miles without change. The crews were changed en route. That was a coal-burning locomotive. Some other roads are running engines in freight service four hundred miles, but they are using oil. That clearly demonstrates that the locomotive is a machine that can be run four or five hundred miles without receiving the attention incident to turning in a round-house. It may have to stop en route to clean its fires, if it is a coal-burning locomotive. We have gotten into the practice of one hundred mile terminals simply through force of habit. We are now going around making experiments in another direction which, it seems to me, will add very materially to the use of locomotives, having in mind that every time you turn a locomotive you are losing not less than five and one-half hours, and about a ton and a half of coal.

When you come to the traffic department, how many accounting men have made any analysis that is really worth while to that department, or to the management, in determining whether the road is gaining or losing?

You have the local business coming from the stations on your own line; as to that it is rather easy to learn in a general way from the loading statements, whether you are gaining or losing, and to point out the class of traffic in which the gain or loss occurs. In the same way, why cannot you take the interline reports and analyze them to show the amount of traffic coming from different railroads of the United States or destined to those various railroads, both with respect to the volume and the class of traffic and how it compares with other years over a given period?

We have statements of the gross tons that are handled, the tons handled one mile of the traffic loaded locally and of the traffic received in interchange. But the interchange is unclassified. There is no analysis except as to the immediate connections. There is no analysis showing where that traffic originates, or where it is destined, or to what extent we are getting out of the situation what there is in it.

We might analyze the O. S. & D. reports to see the extent to which reports are made against each station for loading—local and foreign. That will point out the places where there is carelessness in loading cars. That can be supplemented by having photographs taken as the car is broken open at the destination station, or at the place where the damage is located.

We ought also to make an analysis of the increase or decrease in material costs which is due to the number of units of material, and to make a similar analysis of the increase or decrease in material costs due to change in prices. In like manner we ought to make an analysis of the increase and decrease in labor due to the number of man-hours in each class of work, and we ought to show wages as divided between the regular and the extra allowances, and analyze the extra allowances.

Generally speaking in making our comparisons, we make them with the preceding month and with the corresponding month of the preceding year. It is seldom that we find that our statistics extend over a sufficient period of time to indicate the trend. The important question is—are we gaining or are we losing? We should undertake to state our statistics for ten-year periods. That gives us something which will enable every man to see the direction in which we are going.

Take, for example, locomotives: Make an analysis of the aggregate and average tractive power of your locomotives in freight and in passenger service as compared with the aggregate and average tractive power ten years ago or twenty years ago. Has the increase in freight train loading kept pace with the increase in the average tractive power of freight locomotives? Has the loading of freight cars of each class increased correspondingly with the increase in capacity of each class of freight cars?

A statement should be made of the earnings of cars by classes. It need not be exact, but it should be approximately so. What are the earnings per year of box cars or refrigerator cars, of open top cars, of flat cars and of stock cars, etc.? I have had an analysis of that kind made on a number of roads. Generally speaking, it has resulted in the purchase of cars of a different type from that first recommended by the operating department.

Further, an analysis should be made of the reports of the car service department on the shortages of cars at each point on the line. Is it a seasonal shortage, is it one that goes on throughout the year, and for what type of car and what class of traffic?

Generally speaking, when we undertake to buy cars, we look at our per diem balances and give consideration to buying enough cars to offset the per diem balances. But we ought to take into account the loss of traffic that is due to the failure to furnish cars to supply the reasonable demand throughout the year.

I do not know how far these thoughts have interested you. I have endeavored to present them as suggesting or indicating some of the variable factors in the different departments of railroading, in the hope that you will endeavor to understand the problems of those departments and to speak their language, which will bring about that mutual confidence that is essential to successful operations. I thank you. [Applause.]

Mr. A. J. County: Mr. President, I am sure that we are all indebted to Mr. Williams for his able and instructive address. He is one of the men in the railroad profession that I never meet personally, or read the product of his pen, without feeling, "That man makes me think." His career is an inspiration to us all, because not only has he been an able accounting officer, but an officer who has developed the broadest sympathy with every phase of railroading.

Now when Mr. Williams began his address this morning, I began to see that I might have to handle pick and shovel in the coal industry. But we are excluded by law from coal operations, although by law at one time we were urged to get into the coal business to develop the natural resources of the state. As Mr. Williams went on, I saw that he was developing railroad work in three elements: first, the great element of instructing men instead of scrapping them; second, the knowing of the task, and having an officer able enough to tell the men how to attack that job; and, third, how to get results through efficiency and statistics.

There was once an old Quaker who gave this piece of advice to his accounting officers, "When you can't give them dividends, be sure to feed them with statistics." We accounting gentlemen have got to be very careful on that phase of the matter. We have got to give our officers sufficient to enable them to earn dividends and not feed the stockholders with statistics.

Then we have that word efficiency. That is a very fine word. I want to say this; we can talk about efficiency from now until dawn tomorrow morning, but unless we have able men in charge of our accounting forces—fine commanders that have got the "do or die" spirit in them—and are able to put that spirit into our men, we will not get anywhere with fine statistics.

I move that the thanks and appreciation of the Association be tendered to Mr. Williams by a rising vote. [Unanimously adopted.]

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TITLE